

· IN THE CLAIMS

1. (Currently Amended) Method for the process control or process regulation of an installation for the shaping, cooling, and/or heat treatment of metal, especially steel or aluminum, wherein the installation is equipped with actuators for setting specific operating parameters, and the corresponding method process is based on a method model, with which suitable process control and/or process regulation variables for acting on the actuators are determined online with computer assistance after relevant measured values have been detected, ~~characterized by the fact that~~ wherein at least one current actual microstructural characteristic value that provides information about the metal microstructure is detected online at the end of or during the corresponding method process as the relevant measured value, and that, depending on this value and with the use of a microstructure model and the method model on which the process is based, an effect is exerted on the actuators of the method process in order to adjust desired microstructural properties of the metal, such that the following can be nondestructively detected as the actual microstructural characteristic value:

- a microstructural grain size value, preferably by means of ultrasonic or x-ray measuring instruments and/or
- a microstructural transformation time or the microstructural transformation time interval, for example, by detection of the linear expansion of the metallic lattice that is associated with the transformation by means of measuring instruments that contact the metal, such as rolling force measuring devices or measuring rollers and/or
- the microstructural transformation temperature, for example, by means of one or more temperature detection units, which can be moved longitudinally with respect to the direction of metal conveyance and are positioned as a function of the site of the microstructural transformation that is expected on the basis of the microstructure model.

2. (Currently Amended) Method in accordance with Claim 1, ~~characterized by the fact that~~ wherein the austenitic grain size is determined as the microstructural grain size value for the steel group of a C-Mn steel.

3. (Currently Amended) Method in accordance with Claim 1, ~~characterized by the fact that~~ wherein several detection units are used to detect the site or the time interval of the beginning and end of the microstructural transformation.

4. (Currently Amended) Method in accordance with ~~Claim 1, Claim 2, or Claim 3,~~ Claim 1, wherein online microstructural control is carried out in a cooling line of a wire mill with a water-cooled segment of the cooling line and an air-cooled segment of the cooling line, wherein a current microstructural grain size value of the metal wire is detected after passage through the water-cooled segment of the cooling line by means of an ultrasonic measuring instrument, and wherein the temperature of a microstructural transformation and the course of the microstructural transformation, especially the γ - α transformation of steel, with respect to time is detected with temperature measuring devices that can be moved in the direction of conveyance and/or variably oriented.

5. (Currently Amended) Method in accordance with ~~one or more of Claims 1 to 4, characterized by the fact that~~ Claim 1, wherein if a comparison of the actual value and the set value reveals a difference that exceeds a certain value, an online adaptation of the method model and/or the microstructure model is carried out as a function of the detected value that provides information about the microstructure.